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Pressure Measuring Devices – Pressure Gauge Types – Bourdon Tube

Pressure measuring devices from Instruments to Industry can be used for both pressure measurement and pressure indication.

The most common used device for pressure indication is a pressure gauge; pressure gauges can be manufactured with Bourdon tube, diaphragm or capsule pressure elements.

The main benefit to using a pressure gauge over a transmitter or transducer is that the pressure gauge does not need a power source to operate.

To measure a pressure with a gauge then a reference pressure is required; the reference would normally be atmospheric pressure. To find out more on the subject please view our article on “what are the different type of pressure measurement”.

The pressure measuring device will then indicate how much higher (or lower) the pressure is in comparison to the ambient.

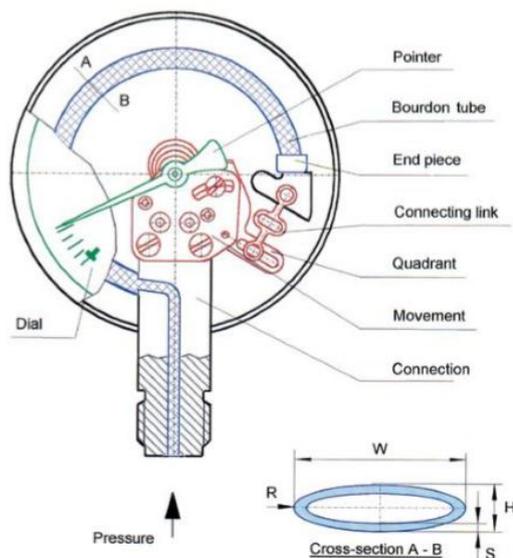
The pressure gauge has a pointer on the dial with a standardised scale, we have an article “units of measurement in pressure” that explains more on this. Pressure gauges can be supplied as either dry or liquid fill.

By having a liquid inside the gauge it works to dampen the effects of high dynamic pressure loads. The liquid will also help to mitigate the effect of vibration.

Pressure gauges are defined as “an instrument for measuring the pressure of gases or liquids, consisting of a semicircular or coiled, flexible metal tube attached to a gauge that records the degree to which the tube is straightened by the pressure of the gas or liquid inside”

Invented and patented by Eugene Bourdon in 1847, the bourdon tube pressure gauge is the second most mass produced instrument in the world, second only to the wristwatch.

The diagram below shows the parts and components that make up a pressure gauge:



The Bourdon tube pressure gauge operates on the principle, the when the gauge is pressurized, a flattened tube tends to straighten or regain its circular form. Most Bourdon tube gauges employ the C shape, which is the type of Bourdon pictured above.

When a gauge is pressurized, the Bourdon creates the dial tip travel to enable pressure measurement. The higher the pressure measurement, the more rigid the Bourdon tube needs to be. When constructing a gauge the tube wall thickness and diameter are key considerations.

Bourdon tube pressure gauges are applied for pressure ranges from 0.6 bar to 4000 bar, mostly with accuracy classes 0.6 to 2.5.